THE GOLDEN TOUCH: HOW SCREEN TOUCHES INFLUENCE PRODUCT ATTITUDE AND PURCHASE INTENTION

BY

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THESIS

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ABSTRACT

The widespread usage of touch screen devices such as smartphones and tablets has changed how people interact with mediated information. The physical action of touch is more direct in that people interact with the information on the screen, rather than indirectly via input devices like a mouse or trackpad. The goal of this study is to examine whether different ways of physically interacting with media influence consumers' attitude and purchase intention in online shopping, and how congruity between the touch feeling of specific products and touchscreens may moderate this effect of interaction. Participants viewed pictures of products which had either congruent or incongruent haptic feeling with an iPad screen by directly touching the screen or indirectly using a mouse, and then indicated their attitude, purchase intention and valuation toward these products. The results showed that consumers assigned more value when product information was acquired by touching. However, the main effect of physical interaction on attitude and purchase intention, and interaction effect between interaction and haptic congruity were not found.

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CHAPTER 1

INTRODUCTION

Our interaction with media and information has become increasingly physical. While in the past, someone could acquire information from media while sitting still in front of a TV set or a computer and pressing buttons on a remote control or clicking a mouse, today the emergence of touchable devices, like mobile phones and iPads, has activated our fingers and enabled us to interact directly with media devices through various physical behaviors. When using an iPad to browse the news, for instance, we directly touch the screen to select pieces of news or zoom into images to obtain more details. Even more advanced technologies such as the newly released SONY PlayStation VR can capture gamers' body movement and enable them to operate avatars in virtual space through real physical actions.

The use of interactive media for advertising has also increased in recent years. The widespread usage of mobile phones, which usually involve physical interaction with touch screens, has contributed to the development of mobile advertising. Mobile has also become an important medium for shopping. Mobile traffic accounted for 57.2% of all online shopping traffic on Black Friday 2015, exceeding desktop (IBM, 2015). Despite the rapid growth in this market, little attention has been paid to how direct physical interaction with media, such as browsing websites and shopping online via touch screen devices, can influence advertising and consumer decision-making.

Previous research has shown that physical actions are capable of priming more abstract, yet semantically related mental concepts that may further influence attitude toward stimuli. Specifically, researchers have found that physically approaching a stimulus could trigger more favorable evaluation (Cacioppo, Priester, & Berntson, 1993; Labroo & Nielsen, 2010). However,

little existing research has looked into how approaching media information by touching a screen might affect people's evaluation. This thesis explores how directly touching the screen of a tablet device might influence consumers' attitude and purchase intention in online shopping. Moreover, the haptic congruity between product and screen was also studied to examine the moderation effect of product type on physical interaction with media.

This thesis begins with a brief review on how people interact with media information. It then presents two fields of research, priming and ownership, to explain how touch may influence advertising effectiveness. Next, it discusses the concept of haptic congruity and how it can influence people's attitude and purchase intention. An experiment is reported in which people engaged in an online shopping exercise through either a touchscreen or an input device (mouse) interface. Finally, the paper concludes with a discussion of the results, limitations and future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Interactivity

Interactive communication media, including the Internet, social media platforms and mobile technology, has made information acquisition much more convenient. Among many important features provided by the new media, interactivity has been considered one of the main characters that distinguishes new media from traditional media like the newspaper or television (Morris & Ogan, 1996; Rafaeli & Sudweeks, 1997). The term interactivity has been defined from various perspectives. For example, Steuer (1992) defined interactivity as "the extent to which users can participate in modifying the format and content of a mediated environment in real time" (p. 84). To capture the three aspects of interaction (user-machine, user-user and user-message interaction), Liu and Shrum (2002) defined interactivity as "the degree to which two or more communication parties can act on each other, on the communication medium, and on the messages and the degree to which such influences are synchronized" (p. 54). In their definition, they specified three dimensions of interactivity: active control, two-way communication and synchronicity. Active control refers to the voluntary actions to customize information flow under the nonlinear network structure. Two-way communication looks into the reciprocal communication between users, while synchronicity is characterized by the simultaneousness of information input and response (Liu & Shrum, 2002).

Under this scope, online marketing tools can differ drastically in terms of the three dimensions of interactivity. For example, web communities provide users with relative high level of active control, because users can control their experience by selecting links based on their goals and interests. While pop-up ads are less interactive in terms of active control due to the

forced exposure. Among these three dimensions, active control is most relevant to this study. Because when comparing a touch interface and a traditional mouse interface, the reciprocal communication and synchronicity of information generally stay constant within the same website. While in terms of active control, a touch interface provides users with more direct interaction in controlling information flow by choosing different links.

Existing research has explored the effect of interactivity on advertising effectiveness. Ariely (2000), for example, studied how different levels of active control might influence product learning and memory in an online shopping scenario. Active control was operationalized as the degree to which participants had the freedom in determining the sequence of information reception. In the high active control condition, participants could choose the path freely when going through the product information; while in the low active control condition, participants could not determine the sequence they received product information. It was found that participants in the high control condition tended to have better memory toward the product. Active control was also manipulated as the number of available links in some studies. For instance, in Sundar, Brown and Kalyanaraman's (1999, as cited in Liu & Shrum, 2002) study, high active control referred to two additional layered information links, moderate control referred to a more information link and low control meant no extra link.

The three-dimensional definition of interactivity proposed by Liu and Shrum (2002) examines interactivity in communication under the broad idea of Internet. They explicated active control by focusing on the nonlinear structure of Internet and comparing it to the linearity of television (despite the ability to switch channels, a person cannot actively determine the content he/she watches on a television). Likewise, past studies mainly operationalize interactivity, especially active control, from a user-message interaction perspective by focusing on users'

ability to control and modify the message flow. While as Internet usage has shifted from desktops and laptops to tablets and mobile phones, an emerging issue in media interaction is that the same message can be acquired from different media devices with different interfaces such as the traditional mouse interface and touchscreen interface. Thus besides the degree to which users can control information in terms of the ability to determine sequence of message or the amount of links embedded in message, interfaces have enabled users to control information in different ways. When using an iPad to browse the news, for instance, people are directly touching the screen to select pieces of news, zooming in images with gestures, making play or pause instructions with videos by touching buttons; when using a desktop or laptop, on the other hand, control can only be exerted by moving and clicking a mouse. As interfaces change the experience of accessing content (Rokeby, 1998), the direct nature of touch may enhance the perceived control over the device and media information may be more salient (Brasel & Gips, 2014) compared to mouse interfaces.

Prior studies have explored the effect of interactivity on advertising effectiveness (Greenwald & Leavitt, 1984; Celsi & Olson, 1988), but the question of how interface interactivity, especially direct touch interface, may influence advertising effectiveness remains an open question. To address this question, the nature of touch in advertising is primarily explored.

2.2 The Effect of Touch on Advertising Effectiveness

Consumers' purchase behaviors usually involve multiple senses. As defined by Krishna (2012), sensory marketing refers to marketing that engages consumers' five senses (haptics, olfaction, audition, taste and vision) and affects their perception, judgment and behaviors.

Among these human senses, recently the sense of touch becomes an area of research in consumer behaviors.

In a purchase situation, touch is used to obtain both non-haptic (picking up a product to see or smell) and haptic (to feel the texture) information. It has been found that it's generally beneficial for marketers to provide consumers with opportunities to touch products. For example, by instructing participants to touch, not touch or view images of products on Internet, Grohmann, Spangenberg and Sprott (2007) found that product evaluations were more favorable in the touch condition than in the no touch or Internet condition. McCabe and Nowlis (2003) examined the effect of touch respectively on material products (texture, roughness, hardness, weight, temperature being the dominant product attributes, e.g. clothes) and geometric products (size or shape being the dominant product attributes, e.g. cans of soda). They found that participants were more likely to buy products with material properties when they were able to examine real products than pictures.

As explored by Grohmann et al. (2007), one explanation to this effect was that touch could provide more information about a product that could hardly be acquired through other senses, resulting in more positive evaluation, especially for products in high quality. In their study, it was found that the effect of touch was moderated by the quality of products. Specifically, for high quality products touch led to more favorable evaluations while it led to more unfavorable evaluations for low quality products. Additionally, another underlying mechanism was the affective reaction to touch. It was found that touch had a significant effect on pleasure, which mediated the effect of touch on product evaluations.

To study touch in advertising and marketing, Peck and Childers (2003) developed the concept need for touch (NFT), which was defined as the preference for extraction and utilization

of information obtained through touch. Need for touch consists of two dimensions: instrumental and autotelic. The instrumental aspect views touch as an approach to gather product information that can hardly be obtained through other approaches, such as reading descriptions and visually inspecting. The autotelic need for touch on the other hand, captures the hedonic or emotional component of touch—touch to seek fun and enjoyment.

Based on the need for touch, Peck and Wiggins (2006) broadened consumer research in touch from touching real products to touching more indirect product representations. They gave respondents brochures for a children's museum that either had a "touch" element (e.g. faux fur) associated with it or did not and measured respondents' attitude toward the message and their intention to become members of the museum. A main effect of the touch element on both respondents' attitude and behavioral intention was obtained in this experiment, even if the touch element did not provide any additional instrumental information of the museum. This may further support the affective reaction mechanism of touch, which suggests that pleasure mediates the effect of touch on product evaluations.

Similar to Peck and Wiggins's (2006) study, acquiring product information through touchscreen interfaces does not give consumers the opportunity to touch real products as well. Based on their findings on the effect of touching product information from brochures, touch interfaces may also affect advertising effectiveness. To support this assumption, literatures from two research areas, priming effect and ownership effect, are reviewed to provide some insights in the following sections.

2.3 Touch and Priming

Priming refers to the facilitation of stimuli processing due to previous exposure to the same or associated stimuli (Tulving, Schacter, & Stark, 1982). Some early studies on priming

were mainly related to lexical decision task, in which words were used as stimuli and subjects' reaction time or recognition toward stimuli were measured (Becker, 1980; Fischler, 1977; McKoon & Ratcliff, 1979; Meyer & Schvaneveldt, 1971). For example in one of the earliest empirical studies in this field, Meyer and Schvaneveldt (1971), by exposing subjects to three sorts of stimuli, which included a pair of words, a pair of nonwords and a word and a nonword, found that subjects' decision on whether a certain stimulus was a pair of word or not was significantly faster when the two words were related (e.g. doctor and nurse). This result suggested that association between stimuli could facilitate cognitive process of the stimuli.

The underlying mechanism of priming, as argued by Meyer and Schvaneveldt (1971), is spreading excitation. The excitation produced when retrieving information from a particular point spreads to nearby points, which facilitates future retrieval of related information. Collins and Loftus (1975) described human memory as a network consisting of nodes, which are representations of different concepts, and associative pathways, linking and specifying relationships between different nodes or concepts. Under a priming paradigm, a certain concept can be activated by a primed stimulus (e.g. a word) and activation tags "radiates out from this particular node along the associative pathways to other nodes" (Berkowitz & Rogers, 1986, p. 58), thus leading to the temporarily easier accessibility of these related nodes. Later, when another related stimulus is encountered, an intersection can be identified with tags left earlier by the prime stimulus, which facilitates the processing of the later one.

More recently, people's actions were studied as priming stimuli to see how physical activities might influence evaluations toward stimuli. Strack, Martin and Stepper (1988), for instance, examined how smiling could prime favorable evaluations. They instructed subjects to hold a pen in their mouth, in order to facilitate the contraction of zygomaticus muscle, which is

responsible for the act of smiling. At the same time, subjects were asked to evaluate cartoons. Results showed that the cartoons were thought to be funnier when subjects were "smiling", even the subjects were not aware of the emotional meaning of their facial expressions. The authors suggested that this affective reaction might be determined by the interaction between people's motor system and the stimuli. Similarly, Wells and Petty (1980) also found that "nodding" (i.e. vertical head movement) could lead to more positive attitude toward persuasive messages. They explained this effect by focusing on the transfer of responses from one context to another compatible one. Since favorable responses were usually generated in the context of vertical head movement, the compatibility between "nodding" and favorable responses led to people's greater cognitive access to positive evaluations in similar context.

More recently, this association between physical activities and evaluations are explained by embodied cognition. The embodied view of cognition argues that concepts are grounded in sensorimotor experiences (Barsalou, 2008; Gallese & Lakoff, 2005). It emphasizes the role of our physical interactions with the environment in shaping the psychological experiences that result from them. Previous research has shown that physical cues associated with different events are capable of activating more abstract mental concepts. For example, Ackerman, Nocera and Bargh (2010) have demonstrated that the weight of a clipboard on which a job candidate's application rested could influence participants' perceptions of the candidate's seriousness. In the same article, another study reported that the firmness of a chair influenced participants' willingness to negotiate a business transaction. Such results are explained by the mechanism that certain states of mind (e.g. seriousness) can be activated by simulating bodily experiences (e.g. the sensation of heaviness) that are associated, or compatible as Wells and Petty (1980) argued, with the states of mind.

One specific domain of embodied cognition research has explored approach and avoidance effects. Such is human nature that we approach pleasure and avoid pain. For example, we have the tendency to touch a baby's face or a friendly-looking animal, while we also deliberately keep ourselves away from snakes or spiders, especially those who are afraid of them. As argued by Labroo and Nielsen (2010), approaching pleasure and avoiding pain are fundamental in human motivations, therefore positive stimuli will result in approach actions, and in contrast, negative stimuli will result in avoidance actions.

Empirical studies also provide evidence for the relationship between approach (avoidance) and positivity (negativity) by revealing that approach actions, in turn, can facilitate positive evaluations. Cacioppo et al. (1993), for example, found that actions related to approaching could trigger more favorable evaluations toward neutral stimuli. In their experiment, subjects were shown a series of Chinese ideographs while pressing desk upward by arm flexion (approaching) or downward by arm extension (avoiding). Subjects in the approach condition rated the neutral ideographs significantly more positively than did subjects in the avoid condition. This phenomenon demonstrates that when experiencing bodily sensations associated with approach, people are induced to evaluate the stimuli more favorably.

Generally touch can be considered a form of approach behavior (Grohmann et al., 2007). To touch something a person has to actively move parts of his/her body toward the target. When directly touching a screen to access information, human hands and arms are usually activated to directly reach the target stimuli. When using a mouse, on the other hand, no such action is involved to physically get closer to the target.

As revealed in past studies, certain physical or psychological body movements, such as arm flexion/extension in Cacioppo et al. (1993) study and mentally pulling toward or pushing

away in Labroo and Nielsen's (2010) study, could activate an approach or avoidance mindset. Based on this, it is plausible to assume that the physical cue of touching and reaching is also associated with the abstract concept "approach good things". Thus when directly touching, an approach mindset will be primed and transfer to positive evaluations.

2.4 Touch and Ownership

Another theoretical approach that may explain the effect of direct touch is the ownership effect. Ownership refers to a connection between a person and an object. Past studies have found that ownership could lead to greater liking toward the owned objects. As an early study in this field, Nuttin (1985), for example, found that people showed greater preference for letters in their own names. In Beggan's (1992) study, ownership was manipulated by giving the experiment objects as gifts for participation or not. It was found that participants owned the objects tended to rate them more favorably. This effect of ownership on object evaluation is called the mere ownership effect.

However, ownership is not only determined by the actually owning of an object or not. Psychologically, ownership is characterized by the feeling that something is "mine" (Pierce, Kostova, & Dirks, 2003), as employees may feel ownership toward the organizations. An important antecedent of psychological ownership is the ability to control the object (Pierce et al., 2003). A direct physical control over an object was found to trigger ownership (Furby, 1980). In a real life situation, touch is a common behavior to directly control an object. Empirical studies have also shown that merely touching an object could increase people's perceived ownership. By asking participants to actually touch a product or not, Peck and Shu (2009) found that the ability to touch resulted in greater perceived ownership. They also found that participants endowed greater value (in money) to products when they were able to touch.

More recently, the relationship between touch interfaces and perceived ownership was explored. Brasel and Gips (2014) studied the effect of interfaces (mouse, trackpad and touchscreen) on psychological perceived ownership. Participants in their study showed significantly greater perceived ownership in the touchscreen condition than both trackpad and mouse conditions. Based on this, it is also plausible to assume that when directly touching a device to acquire product information, people will develop greater feeling of ownership. And due to the mere ownership effect, the perceived ownership under this situation will lead to more favorable evaluations.

2.5 Touch-based Interfaces and Consumer Decision-making

More recently, the role of interfaces in shaping psychological reactions were studied. Brasel and Gips (2014), for example, studied the effect of interfaces (touchscreen, mouse and trackpad) on perceived ownership and the interaction between products' haptic importance and interfaces in a shopping scenario. Touch was found to generate stronger perceived ownership, and this relationship was moderated by the haptic importance of products, which was measured by participants' reported importance to feel and touch specific products when choosing it. Another study by Brasel and Gips (2015) looked into how touch interfaces influenced product search. Results showed that touchscreen users visited more webpages to search for information. They also paid more attention to tangible attributes of the product in making decisions.

This study also explores the influence of touch-based interfaces on consumer decision-making process. Specifically, consumers' attitude, purchase intention and valuation are studied. According to research in priming and ownership, touch interfaces in online shopping may activate an approach mindset and increase user's perceived ownership toward products displayed on touchscreens. The approach and ownership effect, based on past studies mentioned above, can

influence people's evaluation of and purchase decision toward products. The following sections will discuss in detail how advertising effectiveness, specifically attitude, purchase intention and product valuation, can be influenced.

2.5.1 Touch and Attitude

Attitude has been defined as general and enduring positive or negative feelings toward a person, an object or issue (Eagly & Chaiken, 1993). In this study, product attitude is studied and regarded as a consumer's affective evaluation toward products. Evidences from empirical studies on approach effect support that an approach mindset can trigger more positive attitude toward neutral stimuli (Cacioppo et al., 1993) and undesired objects (Labroo & Nielsen, 2010). Touch as an approach action is assumed to activate an approach mindset, therefore directly touching products on a touchscreen may result in more favorable attitude toward products. In addition, the mere ownership effect suggests that people develop more positive attitude toward the owned object. As touch interfaces have been found to led to greater perceived ownership (Brasel & Gips, 2014), this may also support the assumption that people using touch interfaces in online shopping will have more positive attitude.

Thus I hypothesize that:

Hypothesis 1a: *Participants' self-reported attitude toward products will be higher when they access product information by touching the screen than when they access product information by using a mouse.*

2.5.2 Touch and Purchase Intention

Purchase intention refers to the possibility that consumers will plan or be willing to purchase a certain product in the future (Wu, Yeh, & Hsiao, 2011). Purchase intention is believed to be an important precursor of actual purchase behavior. Empirical studies in consumer

research have examined factors that determine consumers' purchase intention. It has been found that attitude toward brand could positively influence people's purchase intention (Lee & Koo, 2015).

Touch can be regarded as a form of approach behavior (Grohmann et al., 2007). Evidences from research in approach effect can be found to support the influence of approach on people's purchase intention. In Labroo and Nielsen's (2010) study, approaching was directly associated with an aversive stimulus in experiment by having subjects simulate physical approach in space toward a negative product they usually avoided and were unwilling to pay for. Surprisingly, subjects did not developed greater aversion when approaching the negative stimulus. They indicated a significant increased liking for the product and also a higher willingness to pay for it.

More directly, previous studies in touch has also established the effect of touch on purchase intention. Peck and Wiggins (2006) found that touch increased consumers' willingness to donate money to a nonprofit organization. In a real life situation, Peck and Childers (2006) also studied the effect of touch on shoppers' real purchase behaviors. They manipulated environmental touch salience by either posting a sign that said "feel the freshness" to encourage touching or no sign. It was found that in the touch condition, shoppers purchased significantly more impulsively, which was operationalized by the degree to which their purchase decisions were planned. This finding suggests that touch could enhance the possibility to make purchase decisions.

Thus I hypothesize that:

Hypothesis 1b: *Participants will report higher purchase intention toward products when they access product information by touching the screen than when they access product information by using a mouse.*

2.5.3 Touch and Valuation

In some consumer research, the effect of touch on the value (usually in money) consumers are willing to assign to the product was also explored. For example, in Peck and Shu's (2009) study, participants were asked to indicate the value of given products in specific scales ($0-$9). Results showed that touch increased product valuation significantly. Brasel and Gips (2014) measured how consumers valued products under touchscreen, mouse or trackpad interfaces by asking participants to indicate how much they would pay and how much they would accept to give up certain products. They also found that products were overvalued under the touch condition. Based on these previous findings, I also hypothesize that:

Hypothesis 1c: *Participants' valuation toward products will be higher when they access product information by touching the screen than when they access product information by using a mouse.*

2.6 Touch and Congruity

Despite the advantages of touch on advertising effectiveness as mentioned above, consumer research has also identified the moderating role of congruity in the effect. Congruity refers to the relationship between elements based on relevancy and expectancy (Heckler & Childers, 1992). Relevancy is defined as material pertaining directly to the meaning of the theme and reflects how information contained in the stimulus contributes to or detracts from the clear identification of the theme or primary message being communicated; Expectancy refers to the degree to which an item or piece of information falls into some predetermined patterns or

structures evoked by the theme (Heckler & Childers, 1992). For example, congruity may refer to the relevancy and expectancy of an ad (e.g. a healthy food ad) in the context (e.g. a health magazine) it appears. Empirical studies have revealed that congruity might exert positive effect on consumers' attitude and purchase intention. Rodgers (2003), for instance, found that participants tended to have higher attitude and purchase intention toward the sponsored product when the relevance between the sponsor and the sponsored website was strong. This was explained by the spreading activation mechanism, in which there were nodes that represented both the sponsor and sponsee. When the linkage was strong between these nodes in the associative network, the information of sponsorship link would be more accessible in forming evaluation, leading to more positive attitude and facilitating attitude-to-behavior process.

Peck and Wiggins (2006) focused on the effect of congruity between a touch element and persuasive message. They also paid attention to individual differences in need for touch. They observed that for people who were high in autotelic need for touch, congruity between the theme of an advertising pamphlet (an arboretum) and a touch element attached to the front of the pamphlet had no effect on their attitude. While for people who were low in autotelic need for touch, a significant decrease in attitude was observed when the touch element was incongruent with the pamphlet information. A possible explanation was that people who were low in autotelic need for touch processed the touch element as part of the message, thus the incongruence led to their confusion and frustration; while people who were high in autotelic need for touch simply responded affectively to the touch elements regardless of the congruity.

Generally, it is reasonable to assume that congruence between the touch feeling and mediated information is associated with more positive persuasive effectiveness. Thus when consumers access product information through directly touching a screen, congruence will

enhance while incongruence will impair their attitude and purchase intention. When product information is obtained by using a mouse, on the other hand, the congruence between the touch feeling and product information will have no such effect. Thus I hypothesize that:

Hypothesis 2a*: For products that have congruent touch feeling with a screen, participants' attitude and purchase intention will be higher when they access product information by touching than using a mouse.*

Hypothesis 2b*: For products that have incongruent touch feeling with a screen, participants' attitude and purchase intention will be lower when they access product information by touching than using a mouse.*

These hypotheses were tested in an experiment in which participants were instructed to acquire information about products, the touch feeling of which was either very similar or very different compared to a touchscreen, by directly touching a device or indirectly using a mouse attached to the same device. Their attitude, purchase intention and valuation toward these products were measured.

CHAPTER 3

METHODOLOGY

3.1 Participants and Recruitment

Fifty-nine participants enrolled in Advertising classes at a large Midwestern university participated in the study for course credit. Responses from four participants who didn't follow the instruction were excluded, leaving fifty-five participants' data for the analyses reported here.

3.2 Design and Independent Variables

This experiment is a 2 (media interaction: direct/indirect) x 2 (haptic congruity: congruence/incongruence) x 2 (product) mixed design. Media interaction is manipulated as a between-subject variable. In the direct condition, information about a product is acquired by directly touching an iPad screen. In the indirect condition, the same process is done via a Bluetooth mouse connected to an iPad. Haptic congruity is manipulated within-subject. It refers to the congruity between the haptic sensation of an iPad screen and the products. In the congruence condition, products that trigger similar haptic feeling as a screen were used. In the incongruence condition, products that trigger very different feelings were selected. Product is a repetition variable and refers to the specific product category being explored.

3.3 Pretest

A pretest was conducted to test the haptic congruity between products and an iPad touchscreen. Products that were congruent and incongruent with the touchscreen in touch feeling were selected for the main study. To be specific, twenty participants viewed pictures of 16 different products. They were asked to rate "to what extent do you feel that the feeling of touching the item in the picture above would be similar to or different from the feeling of touching the screen of a tablet device (e.g. iPad)?" on a 7-point scale from "very different" to

"very similar". Two products with the highest scores, photo frame ($M_{\text{photo frame}}$ = 6.00, SD = 1.03) and digital clock ($M_{\text{digital clock}}$ = 4.80, SD = 1.61), were selected as congruent products (see Figure 1). Two products with the lowest scores, towel (M_{towel} = 1.00, SD = 0) and slippers (M_{slippers} = 1.25, SD = 0.44), were selected as incongruent products (see Figure 2). One extra credit was given for participation. Participants in the pretest were not able to participate in the main study.

3.4 Dependent Variables

Product Attitude. Product attitude was measured using a scale developed by Crites, Fabrigar, and Petty (1994). This scale instructs participants to "Please check the boxes that best describe your opinions toward the above product" using four seven-point semantic differential-type items (dislike/like, negative/positive, bad/good, undesirable/desirable). An overall attitude score for each product was computed by averaging across the four items (frame: α = .92; clock: α = .94; towel: α = .95; slippers: α = .96).

Purchase Intention. Purchase intention was measured using three nine-point semantic differential scales (unlikely/likely, definitely would not/definitely would, improbable/probable) used in previous advertising study (Till & Busler, 2000). Participants were asked, "How likely is it that you would consider purchasing the product?" These three items were also averaged (frame: α = .93; clock: α = .97; towel: α = .96; slippers: α = .97).

Valuation. Participants were also instructed to indicate their valuation toward the products in dollars, by answering "Supposing that you are moving to a new apartment and considering purchasing a photo frame/ digital clock/ towel/ slippers, how much money you would be willing to pay for the above product".

3.5 Procedure

Each participant entered the laboratory, provided informed consent, and sat down at a computer terminal. Participants were randomly assigned to one of two groups. For the direct group, participants viewed product images on an iPad. For each of the four products, there were three different pictures giving different views about the product. Participants were instructed to directly touch the iPad screen to learn about the products as much as possible. For the indirect group, participants were instructed to view the same product information using a Bluetooth mouse. Other instructions were the same as the direct group. The sequence of the four products was randomized for each participant. After viewing all four products, participants answered a questionnaire, measuring their attitude and purchase intention toward each of the four products. The experiment lasted about 10 minutes. When data collection was completed, each participant was thanked, and dismissed.

CHAPTER 4

RESULTS

Participants' rating scores on attitude, purchase intention, and the amount of money they were willing to pay were averaged for both the congruent and incongruent products. Haptic congruity (congruence, incongruence) and product repetition were entered into repeated measures as within-subject factors, and media interaction group (direct, indirect) was entered as between-subject factor.

Hypothesis 1 predicted that participants' attitude, purchase intention and valuation toward products would be higher when they acquired product information by touching the screen than using a mouse. There was no significant main effect of media interaction on product attitude (F (1, 53) = .12, p = .73; see Figure 3). Specifically, product attitude in the direct touching group (M_{direct} = 4.51, SD = .53) was not significantly higher than the indirect group (M_{indirect} = 4.45, SD = .79). The difference between purchase intention in the direct touching group (M_{direct} = 4.90, SD = 1.05) and indirect group (M_{indirect} = 4.74, SD = 1.31) was also not significant (F (1, 53) = .24, p = .62; see Figure 4). Thus hypothesis 1a and hypothesis 1b were not supported.

However, there existed a significant main effect of media interaction on product valuation. Participants in the direct touching group (M_{direct} = 13.16, SD = 4.61) paid significantly larger amount of money than participants in the indirect group (M_{indirect} = 10.46, SD = 4.97; F (1, 53) = 4.36, $p < .05$, $\eta_p^2 = .08$; see Figure 5). Thus hypothesis 1c was supported.

Hypothesis 2a predicted that for congruent products, participants' attitude and purchase intention would be higher when they accessed product information by touching than using a mouse. H2b predicted that for incongruent products, participants' attitude and purchase intention would be lower when they acquired information by touching. No interaction effect was observed

for attitude (F (1, 53) = 1.13, p = .29) and purchase intention (F (1, 53) = .61, p = .44). To be specific, for congruent products, attitude score for the direct group (M_{direct} = 4.48, SD = .79) was not significantly higher than the indirect group ($M_{indirect}$ = 4.22, SD = .89); purchase intention was also not significantly higher in the direct group (M_{direct} = 4.59, SD = 1.41) than the indirect group ($M_{indirect}$ = 4.21, SD = 1.51). For incongruent products, attitude for the direct group (M_{direct} = 4.54, SD = .92) was not significantly lower than the indirect group ($M_{indirect}$ = 4.68, SD = 1.19); there was also no significant difference in purchase intention between direct (M_{direct} = 5.21, SD = 1.36) and indirect group ($M_{indirect}$ = 5.27, SD = 1.99; see Table 1). Thus hypothesis 2a and hypothesis 2b were not supported.

Although not formally hypothesized due to the lack of empirical support, I also analyzed the interaction effect of haptic congruity and media interaction on product valuation. Consistent with findings of attitude and purchase intention, no interaction effect was observed (F (1, 53) = .32, p = .58).

CHAPTER 5

DISCUSSION

This study investigated the effect of different ways of media interaction on advertising effectiveness and how congruity influences this effect. Specifically, I focused on whether directly touching a device versus operating the device indirectly with a mouse may influence people's attitude and purchase intention in an online shopping scenario.

Results reported here don't indicate significant differences in attitude and purchase intention whether product information is acquired directly by touching or indirectly by using a mouse. While a significant main effect of media interaction was found on the amount of money participants were willing to pay for the products. Participants who acquired product information by touching reported significantly higher valuation, supporting hypothesis 1c. However, since past studies have reported consistent effect of touch on attitude and valuation (Peck & Shu, 2009), it was interesting to only see significant result in valuation, not in attitude or purchase intention. A possible reason for the inconsistent findings is participants' devaluation of products due to their perception of the website. Participants in the indirect group were instructed to use a mouse instead of touching the screen directly. From participants' perspective, this might imply that the webpage they viewed didn't support touch function, which might negatively influence their perception and evaluation toward the webpage. This devaluation of the webpage would further transfer to their valuation of products they saw on the webpage, thus leading to significantly lower product valuation in the indirect group.

Another possible explanation comes from the measurement. Because in measuring valuation, participants were asked to imagine that "you are moving to a new apartment and considering purchasing (the specific product)", and then indicate how much money they would

be willing to pay. A specific purchasing situation was provided here to create a "need" for all participants, and make sure that they would make decisions based on their exposure and process of the product information, but not only based on their personal need. Need recognition is the fundamental stage in making purchase decision (Engel, Kollat, & Blackwell, 1973), and since products used in this study (photo frame, digital clock, towel and slippers) are everyday items, it's possible that participants with no need for these products would just report zero in terms of the amount of money they would spend. Whereas in the semantic scales measuring of attitude and purchase intention, there were no additional instructions to help create a situation. Therefore, when indicating the amount of money they were willing to pay, participants might rely more on the knowledge of products, which they acquired through interaction with product information.

5.1 Theoretical Implications

This study may contribute to our understanding of interactivity in today's human-computer interaction environment. Despite the three types of interaction, user-machine interaction, user-user interaction and user-message interaction, in studying interactivity, the emergence of Internet has shifted researchers' focus mainly to user-user interaction and user-message interaction (Liu & Shrum, 2002). The three-dimensional definition of interactivity proposed by Liu and Shrum (2002) also examined this concept mainly in communication under Internet. However, technological development has already enabled us to interact with various types of machines, such as mobile phones, touchable devices and VR machines, in different ways and under different context. By studying how physically touching a device may influence consumers' attitude and purchase intention, this thesis supports the idea that interaction with different interfaces can influence people's perception of media information. Therefore besides

looking into the degree to which users are able to control the message flow, how this control is exerted may also be considered to understand interactivity in new media environment.

This thesis also provides some insights on interface psychology in consumer research. Touch interface psychology is a recent area of research. Studies in this field have explored how touch interface, compared to traditional mouse and trackpad interface, could influence psychological ownership (Brasel & Gips, 2014) and consumers' search behaviors (Brasel & Gips, 2015). This study specifically focuses on how advertising effectiveness could be affected by different interfaces. Results from this study imply that touch interface can influence consumers' purchase decisions.

As mentioned in the literature review, possible explanations to the effect of screen touches on advertising effectiveness are physical priming and ownership effect. Past studies have looked into how approaching actions such as arm flexion could prime favorable evaluations, whereas no study is found to examine the action touch and associated psychological reactions. Though no significant effect of touch was found on attitude, the significant effect on product valuation may partially support that touch can activate an approach mindset. Since the study presented here didn't examine the possible mediating effect of ownership or pleasure, a future study may pay more attention to this aspect and help scholars better understand the underlying mechanisms of screen touches.

5.2 Practical Implications

Findings from this study may also contribute to advertising strategies in online shopping. Although this study fails to support the effect of touching on consumers' attitude and purchase intention, the significant effect of media interaction on the amount of money participants would spend observed in this study suggests that acquiring product information by directly touching

may have some advantages in online shopping. This may encourage advertisers and brands to develop apps for touchable devices like iPads, and focusing on advertising strategies that motivate consumers to download and use their apps.

In addition, this thesis has practical implications for online shopping websites like Amazon and Taobao. Since results from this study show that more direct interaction with product information can lead to greater product valuation, e-venders may consider providing consumers with more engaging interaction with product through 3-D product models and VR technology to increase sales. Recently, Taobao, one of the largest online retailing websites in China, launched a video introducing its latest concept of virtual shopping. With the aid of VR technology, consumers in the future may be able to purchase in a virtual shopping mall, manipulate and inspect products as in offline environment and even receive "real" haptic feedback when touching products. This more direct interaction with product information may further stimulate consumers to purchase online.

5.3 Limitations and Future Research

One of the limitations of this study is the interaction with product information. In the experiment, three pictures were shown for each product. Most participants in the study used the different interfaces to scroll the webpage and go to the next one by clicking the buttons. They didn't fully interact with product information due to the lack of interactive features, which may weaken the effect of media interaction on their perception of the products. In Brasel and Gips's (2014) study on interfaces and ownership, they also displayed product pictures but those pictures were clickable links for participants to obtain more information of the product in the picture. This allowed participants to truly interact with product information through different interfaces. Most online shopping websites, like Amazon, also have multimedia information, including text,

pictures, videos and links, and interactive features such as the ability to select and zoom in/out pictures for detail inspection. So future research may add more interactive features and develop a more reliable online shopping setting.

Another limitation is the device used in this study. Commonly, people operate an iPad by touching, seldom by using a mouse. The connection of a Bluetooth mouse is achieved through jailbreak and installing a package on the iPad. So the operation process is not as natural and smooth as how we use a mouse on a laptop. This may introduce confounding variables, such as task difficulty, and thus influence the validity of the study. If this were the case, rather than screen touches enhancing consumers' attitude and purchase intention, it might be the difficulty of using the mouse that impairs consumers' evaluation and purchase intention toward the products. Future studies could include a control group, in which participants access the same product information on a laptop using a mouse. The control group may function as a baseline for attitude, purchase intention and valuation. And by comparing results from direct and indirect group to the control condition, the cause of the difference between direct and indirect groups may be better understood. Also, future research may consider using more advanced devices with multiple interfaces to study the effect of different ways of media interaction.

The third limitation of the study is the operationalization of congruity. The concept congruity consists of various aspects, such as conceptual congruence and perceptual congruence, whereas this study only pays attention to the similarity between the haptic feeling of a product and an iPad screen. It's possible that besides the haptic feeling, a product can be congruent or incongruent with the screen of a tablet device in other aspects. For example, the fact that a digital clock possesses a screen itself may influence participants' judgment on haptic similarity.

Therefore, future research should be more careful in stimuli selection and operationalizing and pretesting congruity.

In a follow-up study, a fictitious online retailing website can be designed to simulate online shopping scenario. Some common interactive features, such as multimedia information, links for detail information about product and the ability to zoom in/out product pictures, can be provided to facilitate greater interaction with product information. To avoid possible difficulty in operation, devices with multiple interfaces can be used. A recent study on interface psychology used an Android Galaxy Tab tablet because it allows both screen touches and connection for a mouse (Brasel & Gips, 2015), which can be a better alternative to an iPad. Moreover, instead of merely focusing on advertising effectiveness, the possible mediating effect of ownership can also be tested to understand the underlying mechanism of screen touches.

5.4 Conclusion

This study examined how directly touching the screen of a tablet device to acquire product information might influence consumers' attitude, purchase intention and product valuation toward products that triggered congruent or incongruent haptic feeling with the screen. Even though hypotheses were not fully supported, it was found that consumers were willing to pay more when they accessed product information by directly touching. This suggested that touch interfaces had some advantages over traditional mouse interfaces in encouraging consumers to purchase online. It also indicated that physical interaction with media could influence advertising effectiveness.

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TABLES AND FIGURES

Table 1

Means and Standard Deviations for Attitude and Purchase Intention

		Congruence		Incongruence	
Group		Attitude	Purchase Intention	Attitude	Purchase Intention
Indirect (mouse)	Mean	4.22	4.21	4.68	5.27
	Std. Deviation	.89	1.51	1.19	1.99
Direct (touch)	Mean	4.48	4.59	4.54	5.21
	Std. Deviation	.79	1.41	.92	1.36

Figure 1

Congruent Product Stimuli

Photo frame

Digital clock

Figure 2

Incongruent Product Stimuli

Towel

Monored Hand Towel

SHOP NOW

Slippers

Pettimelo Cotton Slippers

SHOP NOW

Figure 3

Attitude toward Congruent and Incongruent Products across Conditions

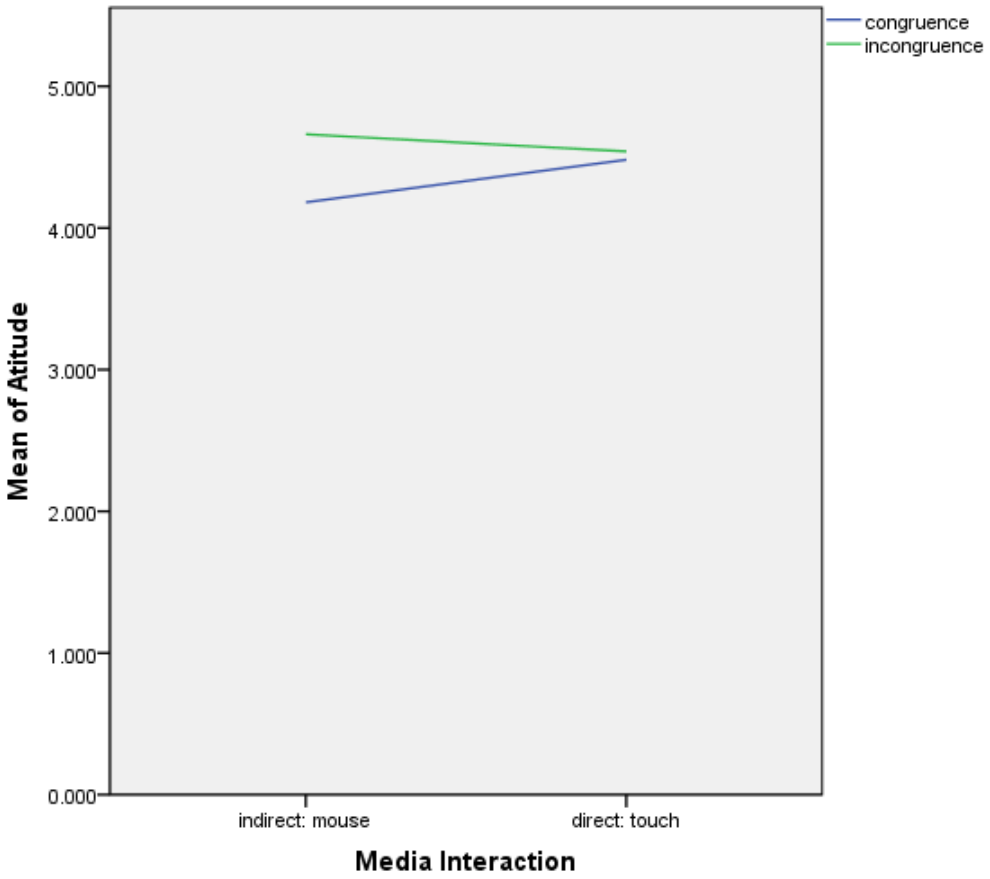


Figure 4

Purchase Intention toward Congruent and Incongruent Products across Conditions

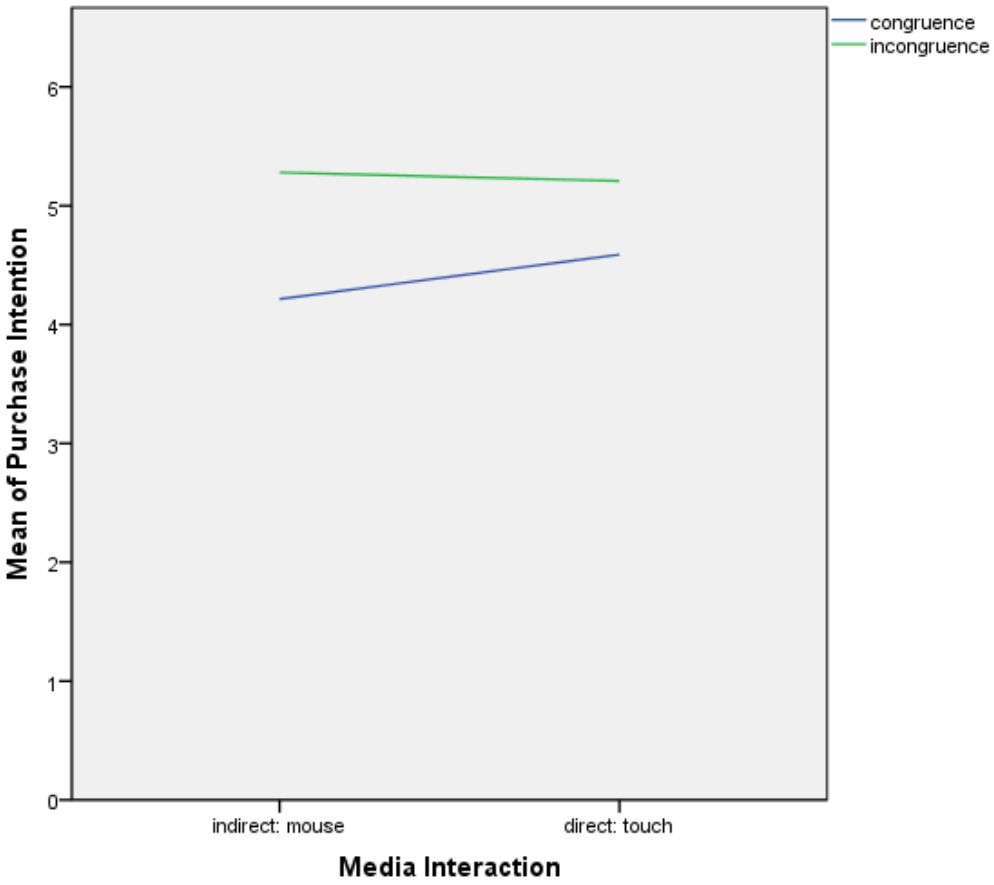
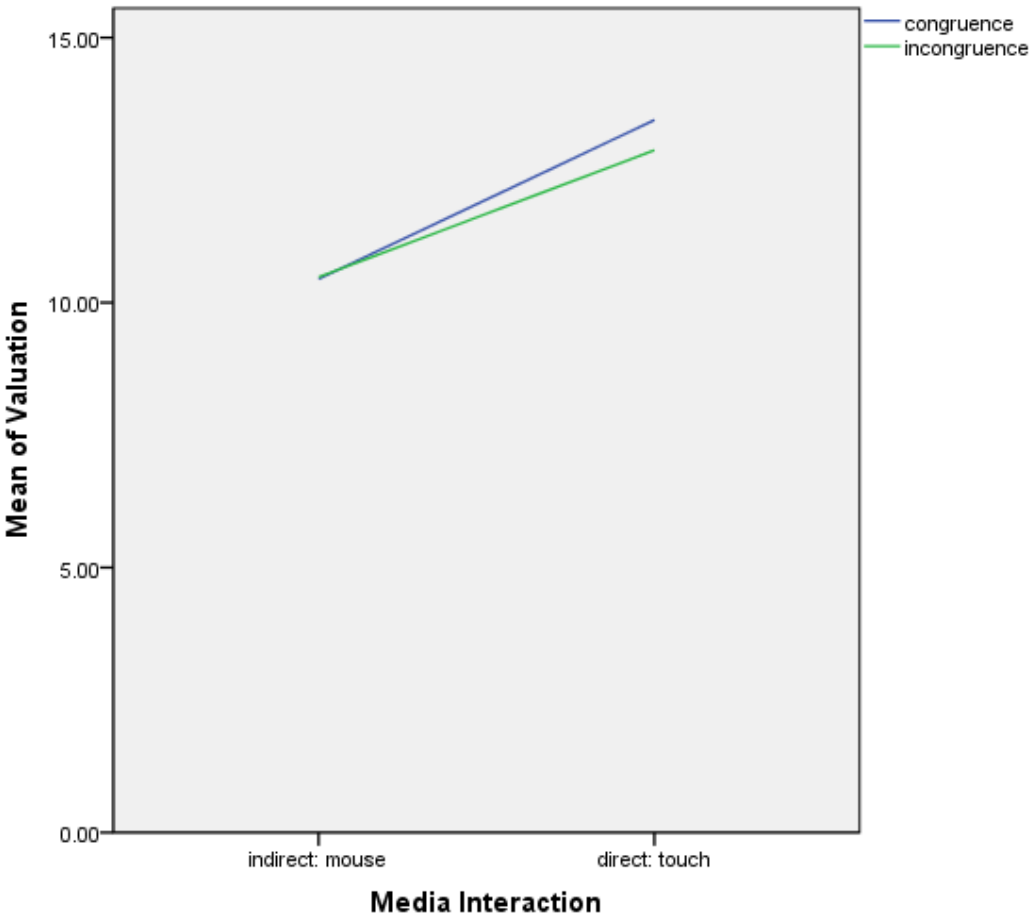


Figure 5

Valuation toward Congruent and Incongruent Products across Conditions



APPENDIX: DEPENDENT MEASUREMENT

Attitude

For each of the word pairs below, please select the spot that best describe your opinions toward the above product.

Dislike	○	○	○	○	○	○	○	Like
Positive	○	○	○	○	○	○	○	Negative
Good	○	○	○	○	○	○	○	Bad
Undesirable	○	○	○	○	○	○	○	Desirable

Purchase Intention

How likely is it that you would consider purchasing the product?

Likely	○	○	○	○	○	○	○	○	○	Unlikely
Definitely would not	○	○	○	○	○	○	○	○	○	Definitely would
Improbable	○	○	○	○	○	○	○	○	○	Probable

Valuation

Supposing that you are moving to a new apartment and considering purchasing a photo frame, how much money you would be willing to pay for the above product?

$ _____